Pensieve header: Computing ν following http://katlas.math.toronto.edu/drorbn/bbs/show?shot=Danc-so-120430-110839.jpg.

```
SetDirectory["C:\\drorbn\\AcademicPensieve\\2012-04"];
<< betaCalculus.m
```

```
Clear[ħ];
$PerturbativeDegree = 4;
βSimplify[expr_] := Replace[
   Series[Normal[expr], {ħ, 0, $PerturbativeDegree}],
   sd_SeriesData :> MapAt[Expand, sd, 3]
  ];
βCollect[B[ω_, μ_]] := B[
   βSimplify[ω],
   βSimplify[μ]
  ];
```

```
{V1, {sol}} = Get["VToDegree4-120420.m"];
```

```
Φ1 = Φ[V1]
```

$$\begin{pmatrix} 1 & h[1] \\ t[1] & \left(\frac{5\,c_1\,c_2\,c_3}{1728}+\frac{23\,c_2^2\,c_3}{3456}-\frac{1}{576}\,c_2\,c_3^2\right)\hbar^3+O[\hbar]^5 & \frac{c_3\,\hbar}{8}+\left(-\frac{67\,c_1^2\,c_3}{3456}-\frac{341\,c \\ t[2] & \frac{c_3\,\hbar}{24}+\left(-\frac{311\,c_1^2\,c_3}{17\,280}-\frac{29}{864}\,c_1\,c_2\,c_3-\frac{113\,c_2^2\,c_3}{17\,280}-\frac{23\,c_1\,c_3^2}{1152}-\frac{23\,c_2\,c_3^2}{2880}-\frac{11\,c_3^3}{2880}\right)\hbar^3+O[\hbar]^5 & \\ t[3] & \frac{c_2\,\hbar}{24}+\left(-\frac{67\,c_1^2\,c_2}{5760}-\frac{1}{64}\,c_1\,c_2^2-\frac{7\,c_2^3}{5760}+\frac{17\,c_1\,c_2\,c_3}{2880}+\frac{19\,c_2^2\,c_3}{1440}+\frac{59\,c_2\,c_3^2}{5760}\right)\hbar^3+O[\hbar]^5 & -\frac{c_1\,\hbar}{8}+\left(\frac{c_1^3}{192}+\frac{5}{288}\,c_1^2 \end{pmatrix}$$

```
{
 Φ1 // dS[2] // dm[3, 2, 2] // dm[2, 1, 1],
 Φ1 // dS[2] // dm[3, 2, 2] // dm[2, 1, 1] // Inverse
}
```

$$\left\{\left(1+\frac{1}{24}\,c_1^2\,\hbar^2+\frac{c_1^4\,\hbar^4}{1920}+O[\hbar]^5\right)t[1],\ \left(1-\frac{1}{24}\,c_1^2\,\hbar^2+\frac{7\,c_1^4\,\hbar^4}{5760}+O[\hbar]^5\right)t[1]\right\}$$

$$\left(1+\frac{1}{24}\,c_1^2\,\hbar^2+\frac{c_1^4\,\hbar^4}{1920}+O[\hbar]^5\right)\left(1-\frac{1}{24}\,c_1^2\,\hbar^2+\frac{7\,c_1^4\,\hbar^4}{5760}+O[\hbar]^5\right)$$

$$1+O[\hbar]^5$$

```
Series[Sqrt[Sinh[x / 2] / (x / 2)], {x, 0, 4}]
```

$$1+\frac{x^2}{48}+\frac{x^4}{23\,040}+O[x]^5$$

```
23040 / 1920
```

$$12$$

```
Series[Sinh[x / 2] / (x / 2), {x, 0, 4}]
```

$$1+\frac{x^2}{24}+\frac{x^4}{1920}+O[x]^5$$